

Program Concern: Explosive Bolt Catchers

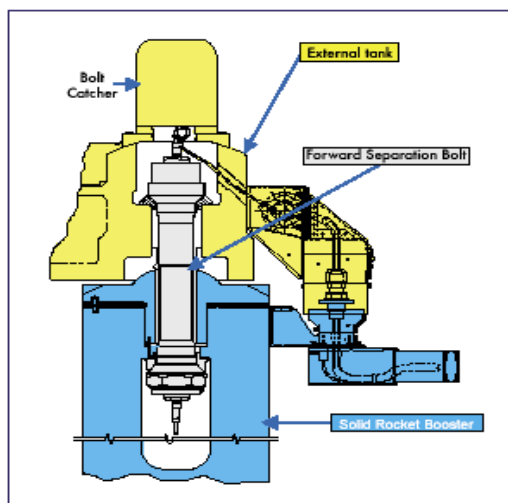
What are explosive bolt catchers?

Devices that catch pieces of the 80-pound, explosive bolts that attach the space shuttle's twin solid rocket boosters to the rust-colored external tank.

Why are explosive bolt catchers a concern?

Investigators do not know whether the solid rocket booster bolt catchers worked on Columbia's last flight. They do know, however, that ground radar at Kennedy Space Center appears to show that the solid rocket boosters shed a piece of debris 126 seconds into flight, a point in time that coincides with their separation from the rest of the vehicle.

What does an explosive bolt catcher look like?



A cutaway drawing of the forward Solid Rocket Booster bolt catcher and separation bolt assembly.



YOUR PREPAREDNESS FOR AN AUDIT OF NASA SAFETY STANDARD FOR EXPLOSIVES, PROPELLANTS, AND PYROTECHNICS WITH THESE SAMPLE QUESTIONS FROM THE AUDIT GUIDE.

MANAGEMENT:

1. How does the Center ensure that the quantity of explosives permitted in an operating building does not exceed the maximum permitted by the Quantity-Distance (QD) criteria?
2. Has a system been established to control the presence of personnel within explosives operating areas?
3. Is worker training continually updated as necessary?
4. Are appropriate fire symbols displayed on all facility buildings and storage sites containing explosives, pyrotechnics, and similar hazardous materials?
5. Is a master list of all storage explosive sites and their locations, fire symbols, chemical storage sites, and available empty storage sites maintained current by the local fire and security office?

EXPLOSIVES WORKERS:

1. Is proper personal protection clothing and equipment used during all work with or near explosives?
2. Is all new, newly modified, or repaired equipment to be used in hazardous operations examined and tested by competent designated operating personnel and supervisors prior to use to assure safe working conditions?



**NASA
SAFETY AND MISSION
ASSURANCE
REQUIREMENTS**

NSS-1740.12

NASA Safety Standard for Explosives, Propellants, and Pyrotechnics

Compliance Verification Guide



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This brochure is intended to be used as a guide only, not as a replacement for the actual policy. To review the NASA Safety Standard for Explosives, Propellants, and Pyrotechnics (NSS-1740.12) in its entirety, see <http://www.hq.nasa.gov/office/codeq/doctree/texttree.htm>



MINIMUM AUDIT POINTS FOR NSS-1740.12

Leadership and Management

- ▶ **NASA Administrator** shall furnish, to each employee, employment and a place of employment that are free from recognized hazards that are causing or are likely to cause death or serious physical harm.
 - **Objective Quality Evidence (OQE) – 29 CFR 1960.8(a)(1)**
- ▶ **NASA Headquarters Safety Office** ensures approval of site plans is obtained prior to initiating concept design and changes.
 - **OQE – Approval Authority**
- ▶ **NASA Program Managers** ensure that design of all new NASA explosives facilities, except those whose design phase is beyond the Preliminary Design Phase or 30-percent completion and conforms to the requirements established herein and references as applicable.
 - **OQE – Design and Engineering Plans**
- ▶ **Authority Having Jurisdiction (AHJ)** with guidance from the Safety Office will determine level(s) of training commensurate with operation being performed.
 - **OQE – Training Programs**
- ▶ **NASA Field Installation Safety Office and the AHJ**
 - Have approval authority for explosive safety site plans and general construction plans for facilities or structures containing explosives, pyrotechnics, and propellants, as well as modifications to these facilities.
 - **OQE – Approval Authority**
 - Have approval authority for general construction plans for facilities with activities not involving explosives,

pyrotechnics, or other similar materials, but would be exposed to explosive hazards if not properly located in accordance with required Quantity Distance (QD).

- **OQE – Approval Authority**

Core Process

- ▶ **AHJ**
 - Ensures that working explosives limits shall never exceed the minimum required for efficient, safe operation.
 - **OQE – Building, Facility, Personnel Assessments**
 - Shall review explosives and personnel limits for each location and shall recommend changes as required. When an operation changes, explosives and personnel limits shall be reestablished as required. A facility site plan shall show protection provided against explosion propagation between adjacent bays or buildings, as well as protection of personnel against death or serious injury from accidents in adjacent bays or buildings.
 - **OQE – Building, Facility, Personnel Assessments**
- ▶ **AHJ, Supervisor**
 - Shall ensure that operational procedures are generated for all explosives operations.
 - **OQE – Site and Project Specific Procedures**
 - Shall ensure that all (explosives, pyrotechnics, and propellants) motor vehicle shipments are governed by the Department of Transportation (DOT) and shall comply with State and municipal regulations.
 - **OQE – Transport Plans, DOT Regulations**
- ▶ **Local Fire and Security** shall keep a master list of all storage explosive sites and their locations, fire symbols, chemical storage sites, and available empty storage sites. This list shall be available to emergency forces at all times.
 - **OQE – Emergency Preparedness**
- ▶ **Supervisor, Laboratory Supervisor** the personnel limits and quantity of explosives used in any NASA Laboratory Facility must be established by the operating organization and approved by the responsible safety office.
 - **OQE – Facility Assessment**

▶ Supervisor

- Shall be responsible for enforcing provisions of all procedures used in their jurisdictions.
 - **OQE – Documented Training**
- Shall be responsible for determining the training for the worker, verifying that the worker is adequately trained to perform the task safely and efficiently, ensuring that the worker can perform required emergency duties, providing on-the-job training for the workers, and continually updating worker training.
 - **OQE – Documented Training**
- Shall ensure that Protective Clothing and Equipment (PCE) is issued to NASA employees at government expense in those situations where engineering controls, management controls, or other corrective actions have not reduced the hazard to an acceptable level, or where use of engineering controls, management controls, or other techniques are not feasible.
 - **OQE – Site Hazard Assessments**
- ▶ The training for explosives work shall define and communicate the potential hazards involved, teach correct skills for safe performance of the task, prepare personnel for unexpected hazardous conditions, ensure that personnel read and understand the appropriate operating procedures, and provide employee hazardous materials information.
 - **OQE – Documented Training**

Process Check

- ▶ **Program Manager** shall ensure the safety of all explosives operations associated with NASA programs is an ongoing, primary concern and is continually given high priority in all program direction and management.
 - **OQE - NASA Handbook**
- ▶ **AHJ, Supervisor** shall provide information on major/high visibility projects as requested by NASA Headquarters to the Headquarters Safety Office for review prior to 30-percent reviews or Preliminary Design Reviews (PDRs).
 - **OQE - PDRs**
- ▶ **Supervisor** shall maintain Training Records for each worker.
 - **OQE - Training Records**